WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:

a silicon substrate; and

a gate dielectric film provided on the silicon substrate, the gate dielectric film includes at least a first oxide film and an oxynitride film formed on the first oxide film,

wherein a peak position of a concentration of nitrogen of the gate dielectric film is located in a range of 0.5 nm – 1.5 nm from a surface thereof, and in a range of 0.3 nm – 2.0 nm from an interface thereof with the silicon substrate, and an element concentration peak of the nitrogen is $7 \times 10^{21}$ or greater.

2. The semiconductor device according to claim 1, further comprising a second oxide film formed on the oxynitride film, the peak position of the concentration of nitrogen of the gate dielectric film is located in a range of 0.3 nm – 2.0 nm from the interface with the silicon substrate, and the element concentration peak of the nitrogen is $7 \times 10^{21}$ or greater.

3. A method for manufacturing a semiconductor device, comprising:

forming an oxynitride film on a surface of a silicon substrate by performing a heat treatment on the silicon substrate in an oxynitriding gas under a condition in a range of 1000°C – 1150°C for 120 – 200 seconds; and

forming a first oxide film on the surface of the silicon substrate by conducting a heat treatment on the silicon substrate in a first oxidizing gas.

4. The method for manufacturing a semiconductor device according to claim 3, further comprising conducting the heat treatment on the silicon substrate in the oxynitriding gas in a range of 1100°C – 1150°C, for 20 – 200 seconds.

5. The method for manufacturing a semiconductor device according to claim 3, further comprising providing a film thickness of the oxynitride film in the range of 0.5 nm – 3.0 nm, and a film thinness of the first oxide film greater than 0 nm, and less than 1.0 nm.

6. The method for manufacturing a semiconductor device according to claim 3, further comprising forming a second oxide film on the surface of the silicon substrate by conducting a heat treatment on the silicon substrate in a second oxidizing gas, before forming the oxynitride film.

7. The method for manufacturing a semiconductor device according to claim 6, further comprising mixing the second oxidizing gas of oxygen gas and nitrogen gas with the oxygen gas being mixed by 10 – 30 weight%, setting a

temperature of the heat treatment when forming the first oxide film in a range of 800°C – 1000°C, and setting a time in a range of 20 – 60 seconds.

8. The method for manufacturing a semiconductor device according to claim 6, further comprising forming a thickness of the first oxide film in a range of 0.3 nm – 1.0 nm, forming a film thickness of the second oxide film in a range of 0.5 nm – 2.0 nm, and forming a film thickness of the oxynitride film in a range of 0.3 nm – 1.5 nm.

9. The semiconductor device according to claim 1, wherein the silicon substrate has been washed with hydrofluoric acid.

10. The semiconductor device according to claim 1, wherein the silicon substrate is planarized.

11. The semiconductor device according to claim 1, wherein the oxynitride film is formed from the group consisting of nitrogen monoxide gas, nitrogen dioxide gas and dinitrogen monoxide gas.

12. The semiconductor device according to claim 1, wherein a thickness of the oxynitride film is in a range of 0.3 nm – 1.5 nm.

13. The semiconductor device according to claim 1, wherein a thickness of the oxide film is in a range of 0.3 nm – 1.0 nm.

14. A semiconductor device, comprising:

a silicon substrate; and

means for reducing an amount of gate leakage, wherein a peak position of a concentration of nitrogen of the means for reducing an amount of gate leakage is located in a range of 0.5 nm – 1.5 nm from a surface thereof, and in a range of 0.3 nm – 2.0 nm from an interface thereof with the silicon substrate, and an element concentration peak of nitrogen is $7 \times 10^{21}$ or greater.

15. The semiconductor device according to claim 14, wherein the silicon substrate has been washed with hydrofluoric acid.

16. The semiconductor device according to claim 14, wherein the silicon substrate is planarized.

17. The semiconductor device according to claim 14, wherein the means for reducing an amount of gate leakage is formed from the group consisting of nitrogen monoxide gas, nitrogen dioxide gas and dinitrogen monoxide gas.

18. The semiconductor device according to claim 14, further comprising an oxide film formed on the means for reducing an amount of gate leakage, the peak position of the concentration of nitrogen of the means for reducing an amount of gate leakage is located in a range of 0.3 nm – 2.0 nm from the interface with the silicon substrate, and the element concentration peak of the nitrogen is $7 \times 10^{21}$ or greater.

19. The semiconductor device according to claim 14, wherein the means for reducing an amount of gate leakage includes an oxide film having a thickness in a range of 0.3 nm – 1.0 nm.

20. The semiconductor device according to claim 14, wherein the means for reducing an amount of gate leakage includes an oxynitride film having a thickness in a range of 0.3 nm – 1.5 nm.